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IS : 7654 • 1987

Indian Standard
SPECIFICATION FOR
RUBBER HOSE FOR CHEMICALS
(*First Revision*)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR RUBBER HOSE FOR CHEMICALS (*First Revision*)

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Indian Standard
SPECIFICATION FOR
RUBBER HOSE FOR CHEMICALS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 8 September 1987, after the draft finalized by the Rubber Products Sectional Committee, PCDC 13 had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 This standard was first published in 1975. In this revision, requirements for proof pressure and burst pressure have been made more stringent in accordance with the latest international practice. Further, the lining and cover thickness have been made uniform for both types of hoses and requirements for tensile strength and elongation at break after accelerated ageing have been modified and all other changes necessary to align this standard with others in this series of standards on hoses have also been introduced.

0.3 The type of rubber compound to be used for lining and the cover of the hose shall depend on the nature of the liquid for which the hose is to be employed. Consequently the purchaser, while placing the order shall specify the chemicals for which the hose is required. However, in general, the rubber lining and the cover should not contain any material capable of being leached out by immersion in such liquids. The hoses covered by this specification are suitable for only discharge of the chemicals and not suction.

0.4 This standard contains clauses 4.1.3, 4.1.4 and 7.1 which call for an agreement between the purchaser and the supplier.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in

*Rules for rounding off numerical values (revised).

the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for hose of rubber meant for discharging chemicals, such as mineral acids, alkalis and aqueous solutions of inorganic salts for working pressure not exceeding 1 MPa.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 7503 (Part 1) - 1974*, shall apply.

3. TYPES

3.1 The hoses shall be of the following types:

Type 1 — for conveying dilute chemicals, and

Type 2 — for conveying concentrated chemicals.

4. REQUIREMENTS

4.1 Materials

4.1.1 *Lining* — The lining shall consist of a suitable rubber compound resistant to chemicals for which the hose is to be used.

4.1.2 *Reinforcement* — The textile reinforcement shall be provided by natural or man-made fibre, fabric or yarn.

4.1.3 *Cover* — The cover shall consist of a suitable rubber compound resistant to chemicals for which the hose is to be used. The lining and cover shall be of uniform thickness, reasonably concentric and free from air blisters, porosity and splits.

NOTE — The purchaser, while placing the order, should specify the type of reinforcement required by him.

4.1.4 As required by the purchaser, hose of nominal bore not greater than 38 mm may be mandrel or non-mandrel made; hose of nominal bore above 38 mm shall be mandrel-made. The finish may be smooth, fluted or fabric marked.

*Glossary of terms used in rubber industry.

4.1.5 The ends of the hose in each length shall be securely sealed with rubber, 1.5 mm *Min* in thickness, to prevent liquids from coming into contact with the reinforcement.

4.2 Dimensions and Tolerances

4.2.1 Bore Size — The nominal bore size of the hoses with tolerances when measured according to the method prescribed in 4.1.2 of IS : 443 - 1975*, shall be as specified in Table 1.

TABLE 1 BORE SIZES AND TOLERANCES ON BORE SIZES

| Sl. No. | NOMINAL BORE | TOLERANCE ON NOMINAL BORE SIZE |
|---------|--------------|--------------------------------|
| (1) | (2) | (3) |
| | mm | mm |
| i) | 10.0 | ±0.75 |
| ii) | 12.5 | ±0.75 |
| iii) | 16.0 | ±0.75 |
| iv) | 20.0 | ±0.75 |
| v) | 25.0 | ±1.25 |
| vi) | 31.5 | ±1.25 |
| vii) | 38.0 | ±1.50 |
| viii) | 45.0 | ±1.50 |
| ix) | 50.0 | ±1.50 |

4.2.2 Thickness of Lining and Cover — The minimum thickness of lining and cover, when measured in accordance with 4.2.2 of IS : 443-1975*, shall not be less than 2.00 and 1.3 mm respectively, in all cases.

NOTE — In case of fluted hose, the cover thickness shall correspond to the measurement made at a point where the thickness of fluting is included therein, and that the depth of the flute should not exceed 0.5 mm.

4.2.3 The tolerance on any specified length of hose shall be ±1 percent.

4.3 Requirements for Physical Characteristics on Finished Hoses

4.3.1 Tensile Strength and Elongation at Break of Lining and Cover — The tensile strength and elongation at break of rubber used for lining and cover of the hose, when tested in accordance with the method

*Methods of sampling and test for rubber hoses (*second revision*).

prescribed in 5 of IS : 443-1975*, shall comply with the requirements shown in Table 2.

TABLE 2 TENSILE STRENGTH AND ELONGATION AT BREAK OF LINING AND COVER

(Clause 4.3.1)

| HOSE TYPE | MATERIAL | TENSILE STRENGTH, Min | ELONGATION AT BREAK, Min |
|-----------|----------|--------------------------|-----------------------------|
| (1) | (2) | (3) | (4) |
| | | MPa | Percent |
| 1 and 2 | Lining | 7 | 250 |
| | Cover | 7 | 300 |

4.3.2 Accelerated Ageing Test

4.3.2.1 Type 1 — After ageing at $70 \pm 1^\circ\text{C}$ for a period of 72 hours in accordance with the method prescribed in 6 of IS : 443-1975*, the rubber used for lining and cover of Type 1 hose shall not vary by more than the values specified in Table 3 for tensile strength and elongation at break of the corresponding values obtained before ageing.

TABLE 3 ACCELERATED AGEING REQUIREMENTS

(Clauses 4.3.2.1 and 4.3.2.2)

| HOSE TYPE | MATERIAL | CHANGE IN TENSILE STRENGTH, Max | CHANGE IN ELONGATION AT BREAK, Max |
|-----------|----------|------------------------------------|---------------------------------------|
| (1) | (2) | (3) | (4) |
| | | Percent | Percent |
| Type 1 | Lining | ± 25 | +10, -30 |
| | Cover | ± 25 | +10, -30 |
| Type 2 | Lining | ± 25 | +10, -30 |
| | Cover | ± 25 | +10, -30 |

4.3.2.2 Type 2 — After ageing at $100 \pm 1^\circ\text{C}$ for a period of 72 hours in accordance with the method prescribed in 6 of IS : 443-1975*, the rubber used for lining and cover of Type 2 hoses, shall not vary by more than the values specified in Table 3 for tensile strength and elongation at break of the corresponding values obtained before ageing.

*Methods of sampling and test for rubber hoses (second revision).

4.4 Performance Requirements

4.4.1 Adhesion — When tested in accordance with the method prescribed in 7 of IS : 3400 (Part 5)-1983*, the minimum value between the lining and reinforcement, between layers and between cover and reinforcement, shall be not less than 1.5 kN/m².

4.4.2 Pressure Requirements — When tested in accordance with the method prescribed in 8 of IS : 443-1975†, the hose shall comply with the requirements given in Table 4, and shall show no leakage, rupture or porosity at proof pressure.

TABLE 4 PRESSURE REQUIREMENTS

| HOSE TYPE | PROOF PRESSURE | CHANGE IN DIAMETER AT PROOF PRESSURE | CHANGE IN LENGTH AT PROOF PRESSURE | MINIMUM BURSTING PRESSURE |
|-----------|----------------|--------------------------------------|------------------------------------|---------------------------|
| (1) | (2) | (3) | (4) | (5) |
| | MPa* | Percent | Percent | MPa* |
| 1. | 1.6 | ±7 | ±7 | 3.15 |
| 2. | 2.0 | ±7 | ±7 | 4.00 |

*1 MPa = 10.2 kgf/cm².

4.4.3 Chemical Resistance Test — When tested in accordance with the method prescribed in Appendix A of this standard, the tensile strength and elongation at break of rubber used for lining of the hose shall not vary by more than ±25 percent.

5. MARKING

5.1 Each length of hose shall bear the following information:

- Manufacturer's name or trade-mark,
- Number of this Indian Standard,
- Hose type,
- Nominal bore size,
- Design working pressure, and
- Quarter and year of manufacture.

*Methods of test for vulcanized rubbers: Part 5 Adhesion of rubbers to textile fabrics (*first revision*).

†Methods of sampling and test for rubber hoses (*second revision*).

5.1.1 For long length moulded type of hose, the above marking shall be made at intervals of approximately 10 metres.

5.1.2 Each length of the hose may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted manufacturers or producers may be obtained from the Bureau of Indian Standards.

6. SAMPLING AND CRITERIA FOR CONFORMITY

6.1 For the purpose of ascertaining conformity of hose in a consignment to this specification, the scale of sampling and criteria for conformity shall be as prescribed in 3 of IS : 443-1975*.

7. TESTS

7.1 Unless otherwise agreed to between the purchaser and the supplier, all tests shall be carried out within three months of the date of receipt of the material by the purchaser.

A P P E N D I X A

(Clause 4.4.3)

CHEMICAL RESISTANCE TEST

A-1. Take a piece of hose 300 to 350 mm long excluding hose connections. Fill in with chemical for which the hose is to be used. Seal both ends of the test specimen and allow to stand vertically at ambient temperature for 24 hours. At the end of this period, drain the hose and wash thoroughly with water. Sample should then be prepared according to 5 of IS : 443-1975* for determination of tensile strength and elongation at break and tested for conformity to requirements prescribed in 4.4.3.

*Methods of sampling and test for rubber hoses (second revision).

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

| QUANTITY | UNIT | SYMBOL |
|---------------------------|----------|--------|
| Length | metre | m |
| Mass | kilogram | kg |
| Time | second | s |
| Electric current | ampere | A |
| Thermodynamic temperature | kelvin | K |
| Luminous intensity | candela | cd |
| Amount of substance | mole | mol |

Supplementary Units

| QUANTITY | UNIT | SYMBOL |
|-------------|-----------|--------|
| Plane angle | radian | rad |
| Solid angle | steradian | sr |

Derived Units

| QUANTITY | UNIT | SYMBOL | DEFINITION |
|----------------------|---------|--------|---------------------------------|
| Force | newton | N | 1 N = 1 kg.m/s ² |
| Energy | joule | J | 1 J = 1 N.m |
| Power | watt | W | 1 W = 1 J/s |
| Flux | weber | Wb | 1 Wb = 1 V.s |
| Flux density | tesla | T | 1 T = 1 Wb/m ² |
| Frequency | hertz | Hz | 1 Hz = 1 c/s (s ⁻¹) |
| Electric conductance | siemens | S | 1 S = 1 A/V |
| Electromotive force | volt | V | 1 V = 1 W/A |
| Pressure, stress | pascal | Pa | 1 Pa = 1 N/m ² |

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